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SKILL GENERATOR ASSESSMENT GAME

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Abstract: *The workshop aims to show the methods used for the developing of the transversal Skill Generator Assessment Game. The objectives are: - Enhancing digital integration in learning, teaching, training and youth work at various levels; - Promoting entrepreneurship education and social entrepreneurship among young people. The workshop describes the steps for developing an ICT-based education tool simulating real life situations in order to support apprentices/VET students to enhance and foster transversal skills needed by the current labour market. The score system embedded within the e-learning tool, instead, will provide a structure for the assessment of the skills developed. Due to the current labour market changes, there is a clear tendency towards the broadening of the required skills portfolio at all occupational levels, linked to "non-routine" tasks. For example, ICT professionals have to develop skills in marketing or management; services workers have to develop customer-oriented skills and digital literacy or tourism services professionals have to look for new ways to attract interest by potential clients. In many knowledge-intensive sectors, skills as managerial and scientific knowledge are in fact more and more frequently needed. This reflects the growing demand from employers for transversal key competences. These personal attributes enhance an individual's interactions, job performance and career prospects. The transversal skills are crucial for employees themselves as well. There are many youngsters choosing self-employment as an alternative option to the regular employment. Young people still in education or training have not yet acquired the necessary knowledge and experiences or skills needed to decide whether the self-employment is suitable as their future career. While hard skills include job specific knowledge, transversal skills relate to a person's ability to interact effectively with co-workers and customers and are broadly applicable both in and outside the workplace, such as problem-solving, analytical skills, self-management and communication skills and stress management skills. Beside the regular entrepreneurial courses focused on economy, business planning, financial management etc. it is crucial for these young people to develop transversal skills, promoting ones creativity, innovativeness, ability to work in team or communication skills. As the output will be an e-learning product will run within the Moodle e-learning platform as LMS providing an infrastructure for MOOC.*

Keywords: *Skills; assessment; gamification.*

I. GAMIFICATION

The gamification concept applies to the most real life scenarios, which implies the environment, the logic of the game, the game mechanics and at least a character. Sometimes the logic of the game is straight forward and the result is always as expected. The serious game experience encourages the players to participate actively and develop a specific behaviour. Gamification always will increase the user experience through engagement, challenges, rewards, thresholds, decision making and sometimes disappointment. Gamification was identified as an upcoming trend on its way to the “peak of inflated expectations”, which is anticipated to be adopted by the mainstream in the next 5–10 years [1].

Taking the game in a business context we could use it as a sustainable way to accomplish a variety of mission-critical business goals, to keep up the moral of a team to engage more efficient with employees, partners, prospects, consumers, and others, and bring them to participate, collaborate, share and interact in some activity or community. The result, gamification, has become a powerful characteristic of the modern society.

Game playing and challenges are deeply embodied in the human psychical and logical levels since the early days of our life.

1.1 Aims of SGAG

Due to the current labour market changes, there is a clear tendency towards the broadening of the required skills portfolio at all occupational levels, linked to “non-routine” tasks. For example, ICT professionals have to develop skills in marketing or management; services workers have to develop customer-oriented skills and digital literacy or tourism services professionals have to look for new ways to attract interest by potential clients. In many knowledge-intensive sectors, managerial skills and scientific reasoning are in fact more and more frequently needed. This reflects the growing demand from employers for transversal key competences.

The transversal skills are crucial for employees themselves as well. There are many youngsters choosing self-employment as an alternative option to the regular employment. Young people still in education or training have not yet acquired the necessary knowledge and experiences or skills needed to decide whether the self-employment is suitable as their future career.

The absence of soft and social skills is often the reason of failure of the VET school leavers when applying for a job. The future employers of the VET students press the VET schools to provide students with these social and soft skills such as communication, team work or stress-management.

The project „Skill Generator Assessment Game“ (SGAG) aim is to develop the crucial soft and social skills of the VET schools students and thus to increase their chance to find a job and to contribute to the general struggle with unemployment. The project is financed by the European Commission and runs from October 2015 to September 2017 in partnership with institutions from Czech Republic (the coordinator of the project), Romania, Italy, Latvia, Poland and Greece.

The common problems in the countries participating in the project are as follows:

- There is a general lack of materials dedicated to transversal skills development. The ones existing are not very appealing for young students, as they deal with skills that are not immediately expendable.
- Teachers have no time to prepare themselves and/or adapt the materials to their needs.

Both problems can be solved using ICT which is more appealing to the students and less time consuming, as they can practise the game within the homework exercises, while the teachers can just use the module that fits their needs.

During the project, the partners will create an e-course to provide educational materials on the skills needed by the market, a digital serious game, used as practical application of the information gained, and a scoring system, used as an assessment method. The platform hosting those tools will be available for apprentice and VET students, teachers, counsellors and other professionals working with young adults.

The form of digital game was chosen in order to shorten the generational and technological gap between today's students and teachers. The two groups (most likely) grew up in a different 'technological environment'. This form is more attractive for students and hence more motivating.

The platform will include modules focused on each of the transversal skill (time management, use of sustainable business model, communication, problem solving and team work) both in the supporting materials/e-course and in the ICT game. The game will serve as self-evaluation tool for students who are, based on their score, able to decide which course suits their needs the best. The game is simulating real life situations faced by today's students. Young adults can relate to the game figures and go through the game intuitively. The structure and rules of the game makes it easier to understand and let the student focus on developing each of the skills in depth, as it enables students to see the outcome of their choices and consequences, and impact on their environment.

1.2 Challenges

As indicators to be followed are:

- Delivering a Story outline
- Creating s Story board
- Developing the Game

The storyboard will consist of the narrative of good practices accompanied by comprehensive guidance on methodological approach and transferable tools. This output will promote information to interested stakeholders and will be the main tool to guide and support the replication/adaptation of the model in dissemination activities. The model will focus on a set of skills selected as the most needed, few others may be added while the development is underway. Some of these skills were chosen as main topics of the game:

- Time management
- Communication
- Problem solving
- The use and aims of sustainable business / entrepreneurship
- Team work

The ICT experts will start suggesting the best technological options for the game support and delivery. The model proposed encourages non-formal learning that combines the use of a serious game for education purpose. The development of the methodology also includes preparation activities for the dissemination phase and will result in an electronic guide made available freely on the project website, allowing potential users to replicate/adapt the practices proposed.

II. THE ROLE OF ENGAGING STUDENTS ADN INTERACTIVE CONTENT

According to their goals, online courses can be grouped in two main categories: (1) courses that inform, and (2) courses that develop skills [2, 3]. In either of them, students' engagement is crucial for the efficiency of the course. But in the case of skills development engaging students and having interactive content is a necessary condition for the achievement of the goal.

Exactly as in face-to-face courses, in order to develop skills students need to actively practice the new skill. Therefore, in online courses, the teacher needs to develop activities that involve the practice of a certain skill in various contexts. Students' learning can be facilitated in online courses by multiple factors:

- The learning content might be presented in multiple ways (text, audio, video);
- The learning content is supplemented with video demonstration on how to perform a skill;
- The learner is allowed time between sessions to practice the demonstrated skill;
- Multiple examples on how to perform a skill are offered;
- Learners can exchange their experiences on how well they did perform the skill and what difficulties they encountered via chat or forum messages;

- The learners can bring their own examples in a forum or by linking pages with examples they found online.

The crucial element, according to Anderson [4,5], is the interaction that happens in a course. This interaction can take a social form: student-teacher or student-student, or it can take the form of student-content interaction. In order to have effective courses, the teachers need to develop interactive content that will engage students and/or to include social interactions with the same purpose of engaging students and encourage them to practice what they just have learned. Engagement and practice are key elements for authentic learning. Including gamification elements will certainly contribute to increasing students' engagement.

III. APPLICATION

The common way of making education is by transferring knowledge in its various forms, using pieces of information linked together by an applied methodology. The information meets learning barriers, especially the selectiveness and specificity of individuals' understanding and memory capacity. Games are able to cross this impediment by triggering human characteristics as incitement to challenges, multiple solution problem solving, planning, strategic thinking, and playful mind, and it can be used as support for the learning process.

We are not debating about replacing the common e-learning systems, nor about doing this with the traditional educational system. Serious games can be used as complementary instruments for a complex learning process, enabling all communication and understanding channels.

Gamification, seen as the application of game-design elements and game principles in non-game contexts, starts from the learning objectives, operationalizing them into short scenarios, in order to create a more engaging content. Gamification is also a solution for creating real changes in attitudes, behaviours and opinions, resulting from individuals' voluntary and constant involvement into attractive scenarios with non-financial or material rewards.

E-learning platforms and course scenarios instruments can be used for creating affordable games for non-leisure purposes and contexts. But the educator has the difficult mission of identifying the best content, Q&A and behaviours to activate those capabilities, leading at the end to tracked changes.

The game, applied into non leisure contexts, encourages the learner to engage with the material longer than in other circumstances. For example, in presentation based learning system the relationship between the fun level of the game and learning outcomes is mediated by motivation and opportunity [6]. The level of challenge and competition in games applied for learning transversal skills is dependent on the level of social interaction with social outcomes and on internal triggers.

According to Theory of Goal Setting by Locke & Latham people who have goals perform better than those who don't. Likewise more difficult but attainable goals generate better results than goals less difficult. Goals can be either directional goals, for which people don't have the image of steps to take to achieve them, with a high degree of motivation, or accuracy goals with a precise plan of steps and procedures for attaining.

The game should be, according to educational needs and field specificity, as simplistic as possible and user friendly, to avoid waste of time on learning the game than learning the content and achieving educational objectives. In order to create the optimum script for delivering game based education it is recommended to encompass multiple instructional methods like presentations, quizzes, demonstrations, practice, feedback, self-assessment and game related characteristics like setting goals, having rules and restrictions, but reshaping them into short scenarios to be integrated into the game. Some of the affected capabilities are knowledge, observable skills, problem solving skills and attitudes.

As was presented before in the theory of game, the backtracking algorithm and others game logic and mechanics [7], there is always a story or topic to be followed, in order to make the game playful, engaging and rewarding for any player. We present here two model to be considered as abstractization of a real case.

The macro model

The young junior professional begins to climb towards the top of the mountain, on winding paths strewn with many obstacles. The player has the control of the trail from start to finish, the path being characterised by the player's choices and his planning capabilities. It works with maps, routes, milestones, budget, time frame and energy capabilities to accomplish the goal of reaching the top. Through mental challenges the player has to remove all obstacles encountered on the way by answering to specific questions. These questions don't have a right or wrong answer, but the answer influences the difficulty of the route by introducing new obstacles, different from those crossed before. Reaching the top of the mountain, represents the achievement of the goal and the acquisition of new skills and competences.

The script

1. Selecting the Character, which represents the level of his professional skills (Junior, Senior, Team Leader, and Manager), where Mentor is the desired level to be reached. Each character represents a level of seniority and determines the difficulty of the route, and it is set by the player's self-assessment according to a guide.
2. Selecting the Map, from a series of maps, which can be viewed in a landscape mode.
3. Setting the optimum route and the alternative ones, no more than two, if desired (plan A, B and C).
4. Setting milestones for every route, where the player considers risky steps (river bends, forests, trees, stones, hills, rocks, curves etc.).
5. Defining the limits of the three dimensions: Budget (expressed in virtual money, not exceeding a certain game limit), Time frame (expressed in minutes, not exceeding a certain game limit) and Energy (expressed by an energy efficiency bar). These limits are fixed ones and can't be changed during the game.
6. The route has between five and twenty time constrained phases, depending on the character, no more than approximately 30 minutes each, according to every player's ability to end it, and no more than one phase per day. At the beginning of every phase the player has to navigate through a content based page from where he will find inspiration for exceeding the obstacles that will be encountered and the answers for the intermediary evaluation. It will require the player's ability for attention and will develop his/ hers analytical, result oriented, problem solving skills.
7. Crossing the route by selecting bricks or obstacles. Each obstacle has an associated question that the player has to answer, with no good or bad solution. But the answer configures the next obstacle and its uniqueness.
8. Consuming the Budget. Every brick and obstacle has a cost, expressed in virtual money, determined through a mathematical formula (the ratio between the number of obstacles and the budget superior limit).
9. Consuming the Energy. The Energy represents the balance between time and money and the degree of ethical answers, and represents the qualitative dimension.
10. Achieving milestones through a performance auto evaluation. The right performance evaluation will reward the player with a time or money bonus, according to their choice.
11. Changing routes at the cross roads, if alternative routes were set.
12. Ending the game will determine the level of competencies and skills acquired, according to a predetermined grid. The player will be informed about the reached level and recommendations, if necessary. Ways to end:
 - a. Finishing the Budget, the inferior limit set by the player at the beginning.
 - b. Finishing the Time, the inferior limit set by the player at the beginning.
 - c. Forcing the exit. This way will give the player the opportunity to start over the game, but no more than two times. The forced exit is a permanent choice during the route and a matter of personal evaluation.

- d. Voluntary exit (exiting at a certain level of competencies, shown as milestones evaluation).
- e. Achieving the Goal.

All through the game the Player can access:

- Help button, for answers regarding the Game, the controls etc.
- Knowledge button, for retrieving the content from the beginning of the phase. The time spent on reading is considered as time consumed playing the game.
- Forced exit button, for starting over the game, without penalties.
- Voluntary exit button, for exiting at a satisfactory level. Active only after the first milestones and ensures the exit at the achieved level after the last milestone.

Goal and game objective:

The Player has to achieve the Mentor's level of competencies and skills, according to the Character chosen at the beginning. The game objective gives the interactivity and dynamism and acts as an instrument for the Player's goal achievement: reaching the top of the mountain.

Competencies (examples):

- o Analytical Ability
- o Disposed to Performance
- o Capacity to Advise
- o Multidisciplinary
- o Holistic Thinking

Skills (examples):

- o Generate status report
- o Building new business
- o Advising people
- o Attention to details
- o Developing plans for projects

Age range:

The Game targets students and young professionals eager to improve their level of specific competences and skills.

Characters:

- Junior (entry level)
- Senior
- Team Leader
- Manager
- Mentor (exit level – if desired)

Objects:

- Map,
- Route,
- Milestone,
- Brick,
- Obstacle, Trash holds
- Budget and time frames,
- Energy efficiency bar,
- Content,
- Quiz, Assessment
- Questions,
- Evaluation bar

- Self-evaluation,
- Button
- Sounds.

The micro model

- The environment - IT&C company;
- The story - The young junior dev. has to grow his experience by participating to all the project he is involved;
- The character - Junior developer, enthusiastic, eager to step up in the hierarchy of the company and his career;
- The challenges - Induction, trainings, tasks, communication, feedback, problem solving, skills, attitudes, aptitudes, decision taking;
- The rewards - Certificates, roles, duties, badges;
- The progress - Junior dev. > Senior dev. > Junior PM > Senior PM > Team Leader.

By nature a game is a product of real life scenario applied virtually or at a physical level to engage a person or a group of people. So the concept of serious gaming was always linked to the human characteristics of learning, experiencing, competing and challenging the unknown by curiosity and research. The progress an and up scaling the levels is the aim of any game.

IV. CONCLUSIONS

As a result of implementing this project, on European level, countries will benefit from more employable school leavers of VET and from lower rates of unemployment. The field of soft skills in VET will be better understood on both international and national level. On individual level, the students will profit from better soft and social skills, teachers will know how to include education of soft skills into teaching process and schools will improve their quality and enlarge their curriculums. From the perspective of longer terms benefits, this project will extend its impact beyond its time schedule thanks to its linkage to the European strategies addressing the issue of VET. The outputs produced will remain available online in order to continue educating students in soft skills. Increased soft and social skills are considered to be another crucial element benefiting individuals, countries and the EU as a complex community.

Acknowledgements

The game aims at enhancing student's transversal key competences, such as problem-solving and critical thinking, analytical skills, self-management and communication skills, and more generally, "non routine skills". The scoring / range system is used to assess the skills improvement as the player go through the game. The end of the game, the player gets a graphical display of the assessment. as mentioned earlier, the assessment will not provide a 'mark' or a 'score' but will make students aware of the development of their skills providing a feedback on what skills then need to work on further.

The expected impact on the participants, participating organizations, target groups and other stakeholders is based on the aims and objectives of the project. The expected impact on all stakeholders starts with a better overall understanding of the needs of potential employers of the VET school leavers concerning social and soft skills of their future employees. Through better understanding of the employers' needs the participating organizations being the educational institutions will be able to react on this kind of skills demand in their future actions and projects.

The main impact on the target group lies in the improvement of the students' transversal skills (time management, sustainability, communication, problem solving and team work) which will consequently lead to higher chances of these VET students/apprentices to find a job. The participating teachers will build their capacities by adding the digital skills level and innovative material usage into

their teaching methods. The impact on the participating schools will reflect in their improved teaching methodologies with an enlarged stress on including soft and social skills into curriculums.

Reference Text and Citations

- [1] [Application Form „Skill Generator Assessment Game” - KA2 - Cooperation for Innovation and the Exchange of Good Practices-Strategic Partnership for vocational education and training.](#)
- [2] Dirksen, J., 2012. Design for how people learn. New Riders, Berkeley.
- [3] Kuhlman, T., 2007. The insider's guide to becoming a rapid e-learning pro. E-Learning Heroes Community. <https://community.articulate.com/e-books/insiders-guide-to-becoming-rapid-e-learning-pro>
- [4] Anderson, T., 2008. The Theory and Practice of Online Learning. AU Press, Edmonton, Second edition.
- [5] Anderson, T., 2003. Getting the mix right again: an updated and theoretical rationale for interaction. The International Review of Research in Open and Distributed Learning, vol. 4, nr. 2. <http://www.irrodl.org/index.php/irrodl/article/view/149/230>. Accessed 28 January 2016.
- [6] [Gartner's 2011 Hype Cycle Special Report Evaluates the Maturity of 1,900 Technologies,](#) <http://www.gartner.com/newsroom/id/1763814>
- [7] Landers, R.N., Callan R.C., Casual Social Games as Serious Games: The Psychology of Gamification in Undergraduate Education and Employee Training,